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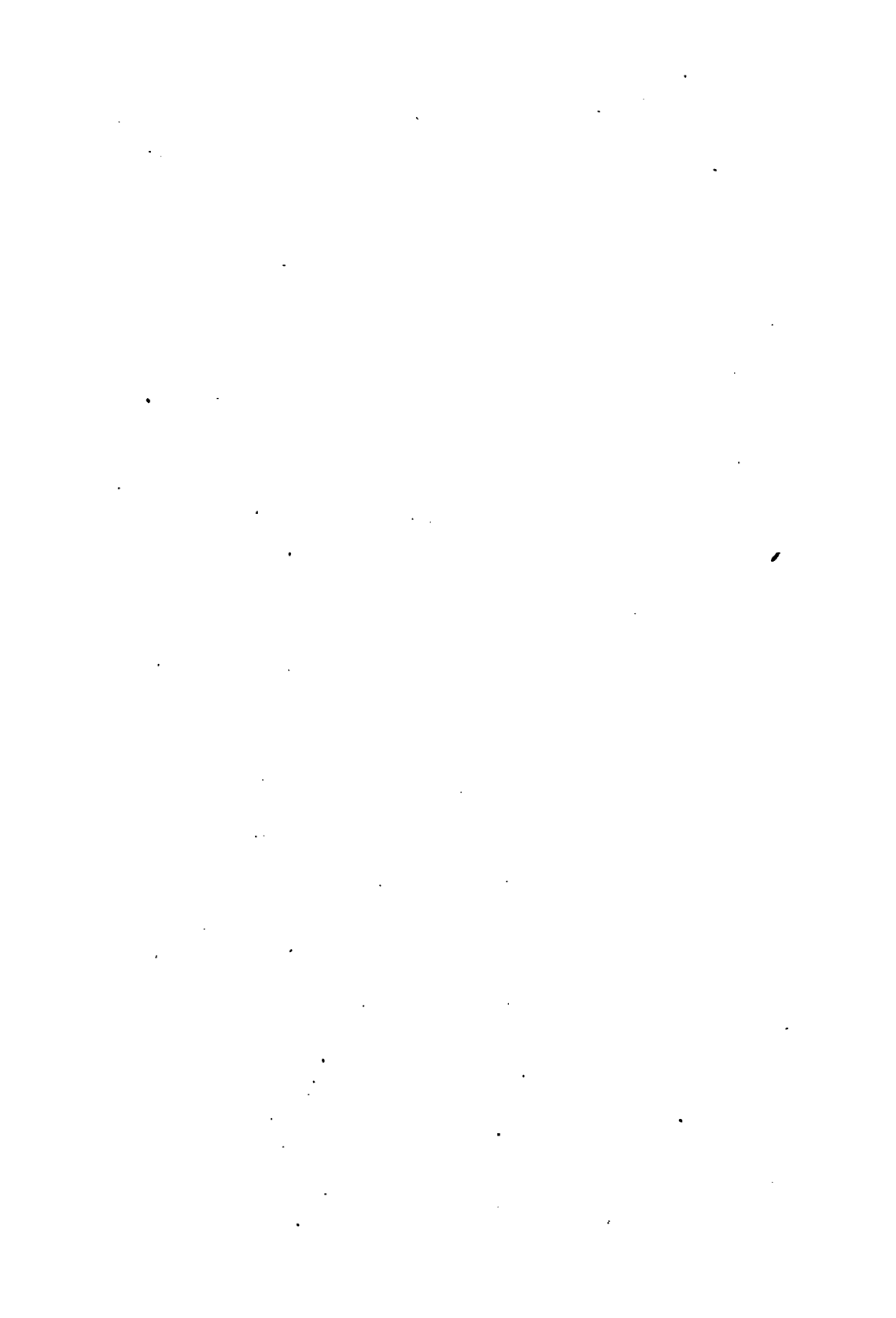
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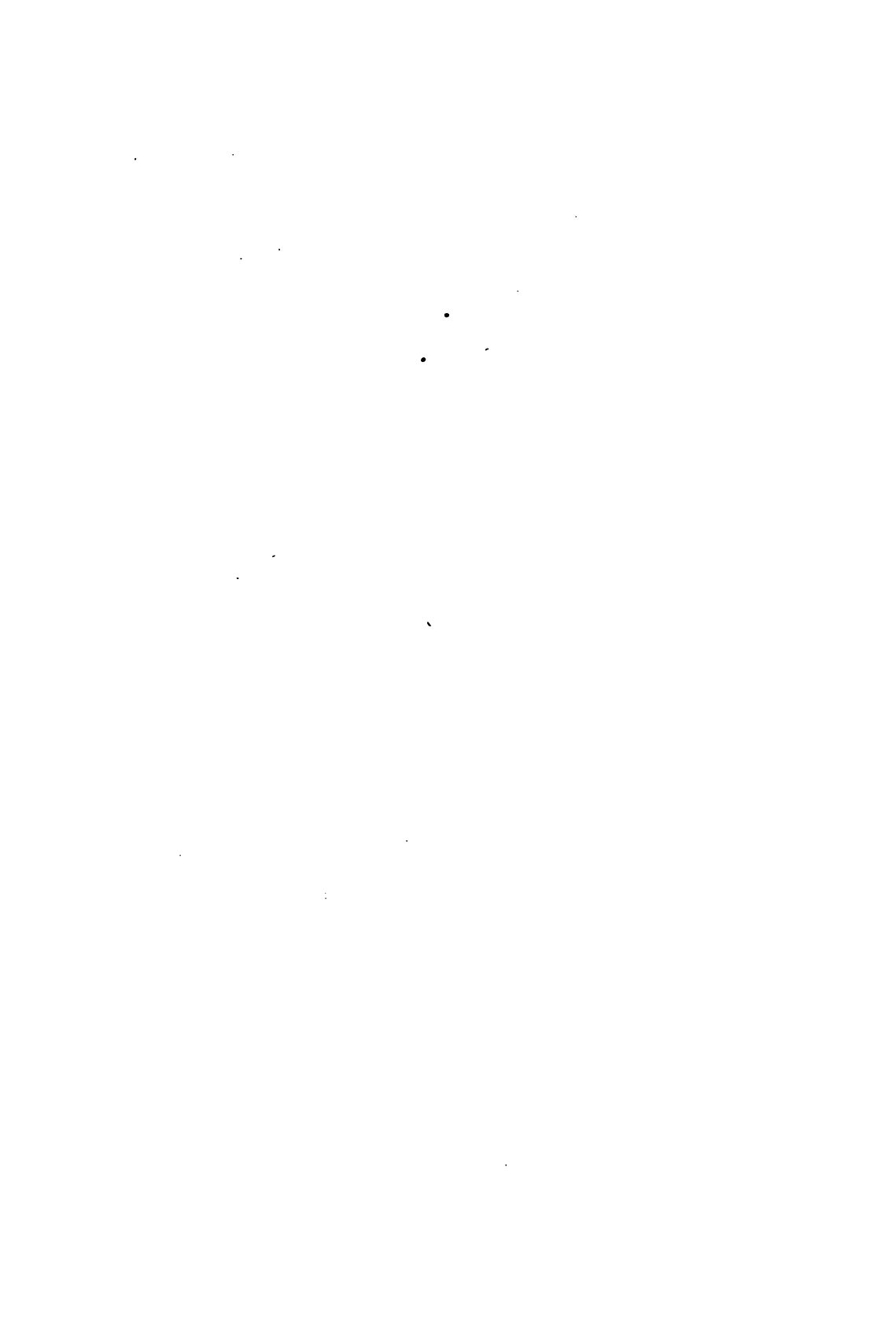


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NOTES

ON THE

MINERALOGY

OF PART OF THE VICINITY OF

DUBLIN.

TAKEN PRINCIPALLY FROM PAPERS OF THE LATE

REV. WALTER STEPHENS, A.M.

LONDON:

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1812.



THE substance of the greater part of the following observations has already appeared, in the first volume of the Transactions of the Geological Society. Since the publication of that volume, the notes taken by my friend Mr. Stephens, in the vicinity of Dublin, principally during excursions which we had made together, have come into my hands; and as they may perhaps excite attention to the subject, and be useful to those who shall hereafter visit that country, I have arranged them, with some additions, for the purpose of distribution to persons interested in mineralogical enquiries. The papers of my friend, however, were not intended for publication, and I have revised them after an absence of some years from the places described: it is therefore more than probable that many of our statements will be found to require correction; but the circumstances I have now mentioned, will I trust be a sufficient apology for their defects.

I regret the more, that I cannot pursue the enquiries which I had begun with Mr. Stephens, as the progress of his observations can never be renewed†: had he survived, it was I believe his intention to have continued them, and to have published a mineralogical survey of the mountainous district in the neighbourhood of Dublin: an undertaking for which he possessed uncommon qualifications, the accuracy of his knowledge and his zeal in scientific pursuits, having been no less remarkable than the integrity and general excellence of his private character.

*WILLIAM FITTON,
London—September 1811.*

† *Mr. Stephens died in December 1808.*



NOTES

ON THE MINERALOGY OF PART OF THE VICINITY OF DUBLIN.

ALTHOUGH the following pages contain but a very imperfect account of the district to which they relate, they may yet be sufficient to shew that the neighbourhood of *Dublin* presents a very instructive field for Geological examination. It will appear that a tract of mountainous country the most varied and interesting in its characters, comprehending a space of more than six hundred square English miles, is ^{situate} placed within a short distance of that metropolis: and this tract is probably not less important in a commercial than a scientific view; for though a very small portion of it has hitherto been surveyed by persons skilled in the art of mining, it has already afforded several mineral productions of considerable value.

The *City of Dublin* is placed in a flat country, at the distance of about three miles from the sea, and about five miles to the north of a range of mountains

forming the verge of an elevated district which extends from thence for more than thirty miles to the south. This district is bounded on its inland or western side by a continuation of the plain country of the neighbourhood of Dublin; and its breadth from the sea, which forms its eastern boundary, is generally about four and twenty English miles.

The basis of all the plain to the north and west of the mountains appears to be limestone of the secondary kind. The mountainous district above mentioned is principally composed of primitive rocks: it is traversed through its whole extent, by a broad tract of granite, which taking its rise at the shore on the southern side of Dublin Bay, crosses the county of Wicklow in a southern direction, being bounded by rocks of great variety, the structure and relations of which, as well as of the granitic mass, are in several places very distinctly exhibited.

The relative extent of the space occupied by granite and by the rocks that occur between it and the limestone, and the general position of their boundaries in the country near Dublin, may be understood from the sketch annexed to these pages†; in which,

† The best maps of the principal counties included in this sketch are, that of Kildare, by Major Taylor; of Wicklow, by Mr. Neville; and an old one of Dublin, by M. Rocque, on a very large scale, of which a reduced copy has also been published. The annexed sketch has been taken from these authorities; but the part within the county of Dublin is very defective; chiefly from the discordance of Rocque's map with those of the adjoining counties. Even in Mr. Neville's map of Wicklow, the mountainous district is very imperfectly represented; and in fact so much of the elevated country near Dublin is uninhabited

it is to be remarked, that the places where observations have been made are denoted by a deeper shade of colour, the lighter tints having been inserted only for the purpose of illustration.

The boundary of the granitic tract, on its southern and a considerable portion of its western confines, remains to be explored: and it is also still to be ascertained by correct observation, whether the space assigned to granite on the map, be occupied exclusively by that rock.

The *Granite* of the counties of Dublin and Wicklow, so far as it has been hitherto examined, has not been found to exhibit much variety in the proportion and character of its ingredients. That of the mountains near Dublin, is in general of a gray colour, and not large grained, consisting principally of yellowish white and gray felspar, of grayish quartz, and a variable proportion of mica of different shades of gray and brown: but a variety with felspar in large grains and of a reddish colour has been also found there, though not in any great abundance. Schorl (tourmaline) is not of uncommon occurrence as an accidental ingredient in the granite of the county of Dublin:—garnet is also frequently to be met with there, and beryl in a few places.

and quite unprofitable, that a map of it intended for general purposes can scarcely be expected to answer the wishes of the Geologist.—The mountains of Wicklow alone, present the extraordinary spectacle of an uninterrupted space of more than an hundred and twenty square English miles, absolutely without inhabitants, commencing within eight miles of a capital containing 170,000 persons.

Porcelain-earth resulting from the decomposition of felspar, has been found at Kilranelagh in the county of Wicklow, in purity nearly equal to the *Cornish "China-clay,"* and the granite is found in a decomposed state so extensively in other parts of that county, that this valuable production may with much probability be expected to occur there in other places, and in considerable quantity.

The rocks incumbent on the granite in this country are very much diversified in their nature, and the developement of their structure and relations, offers a most interesting subject of enquiry. Their variety however would preclude any general description, and I have not myself had an opportunity of examining them sufficiently to be enabled to enter upon a detailed account of them. In the few places where the names of rocks are given in the following pages, they are stated on the authority of Mr. Stephens: and specimens of most of the substances referred to, have been placed in the Museum of Trinity-College, Dublin.

It will be seen, that at the places hitherto examined, the beds of the slaty rocks adjoining the granite, are inclined towards the mass of that rock; and that their direction is nearly parallel to the line of junction.

The principal "metalliferous repositories" of the mountainous district now under consideration, which were known in the year 1807, were veins of copper-ore at *Cronebane* and *Ballymurtagh*, the metalliferous waters of which were described in the Philosophical

Transactions, so long ago as in the year 1757; and of lead-ore, at *Glenmalur*, at *Dalkey*, and at *Ballycorus* near the *Scalpt*.

The stream-works well known under the denomination of "the *Gold-mine*," were placed on the mountain *Croghan-Kinshela*, on the southern verge of the county of *Wicklow*: and gold has been found within that county at another mountain, *Croghan-Moira*, about eight English miles to the north of that place †.

It particularly deserves attention that *Tinstone* has been obtained in fragments at the stream-works of the "gold mine §": for the probability of the discovery of veins of that valuable ore, within a tract of primitive country so extensive as that of *Dublin* and *Wicklow*, appears from this circumstance to be considerable.

The *Plain-country* in which the city of *Dublin* is placed, is very widely extended in various directions. It passes round the elevated tract above mentioned at its north-western angle, and reaches with little interruption, in a southern direction, through the counties of *Kildare* and *Carlow* to the foot of the hills of *Kilkenny* coal district, and to the south-west, through the *King's* and *Queen's* counties, to the foot of the

† Since the period above mentioned, veins of lead-ore of considerable value have been opened in the vicinity of *Glendalough*.

‡ Gold is said to have been found also at the *King's River*, near the village of *Holywood*, in the county of *Wicklow*.

§ Report on the *Gold Mine* by Messrs. *Mills* and *Weaver*.—Transactions of the *Dublin Society*, vol. 3.

Sliebh-bloom mountains. It has also considerable extent towards the north and north-west.

The *Hill of Allen*, which is about three hundred feet in height above its base, with those in its vicinity of *Redhills*, *Dunmurry*, and the *Chair of Kildare*, form the principal interruptions of this plain in the county of Kildare. These hills, with the exception of the second, are composed of green-stone; the *Red-hills* consist of conglomerate†.

The base of all the flat country appears, as has been mentioned, to consist of secondary (flætz) limestone. In the more immediate neighbourhood of Dublin, *calp* is the prevailing variety of that substance; and the quarries near the city afford specimens of several of the more common calcareous productions. Magnesian limestone occurs in beds at Milltown on the river Dodder; and brown-spar (sidero-calcite of Kirwan) is found at Dolphinsbarn in veins that traverse the beds of calp, which are there very distinctly exhibited.

The *Calp* or "black-quarry-stone" of Dublin, is a variety of limestone in some measure peculiar to that country, and has been thought by Mr. Kirwan of sufficient importance to deserve a name and place in his arrangement as a distinct species: I have therefore inserted in a subsequent page a detail of its external characters and composition, from a memoir published

† Report, &c. to the Commissioners on the Bogs of Ireland, by Mr. Griffith junior, 1810, p. 16, 17.

in the Transactions of the Royal Irish Academy†, by the Hon. Mr. Knox; as this paper may possibly come into the hands of some persons who have not access to that publication.

The *limestone* of the more usual characters which is quarried in several places near Dublin for the production of lime, is of the compact kind, in general of a smoke gray, or bluish gray colour; its fracture flat conchoidal and splintery. It is traversed by veins of calcareous spar and of brown-spar, and usually abounds in petrifications, specimens of which, remarkable for their perfection and variety, may be obtained at *St. Doolaghs*, and at *Feltrim*, about seven miles to the north-east from the city.

The beds of the calp and limestone appear in general to be little inclined to the horizon; but they often exhibit marks of dislocation; and in some places are singularly inflected, as is the case remarkably with those observable in the bank of the river Liffey, near the bridge at *Lucan*.

The petrifications of the calcareous country now described, the occurrence of beds of calp and of magnesian limestone, and the imbedded siliceous masses, which are abundant in several parts of it, afford some of the features that may assist in deciding to which of the "formations" of Werner it is to be referred, or whether it properly belong to any of them;

† Vol. viii. p. 207.

a point of some geological interest, from the great extent of the space occupied by the limestone in several of the counties near Dublin.

HAVING stated generally in the preceding paragraphs some of the principal mineralogical features of the country to which they relate; I shall mention more in detail a few facts respecting such places as Mr. Stephens and myself were enabled to examine. Our observations were in a great measure confined to a small extent of the north-eastern confines of the granite; and our immediate object was to determine the boundary of the space occupied by that rock: I shall therefore follow the course of that boundary in the order of these remarks†.

The country around the village of *Bray*, at the distance of ten miles from Dublin, will be found not less instructive to the mineralogist, than it is interesting from the beauty of the scenery which it presents in common with many other parts of the county of *Wicklow*; and the appearances observable at *Killiney*, first noticed I believe by Dr. Blake of Dublin, particularly deserve attention.

† The passages of these pages marked with inverted commas, have been taken with very little alteration, from Mr. Stephens's papers.

The junction of the slaty rocks with granite begins at the sea side, beneath *Killiney-Hill*; and the line of junction is visible to a considerable extent at that place, and near the top of the hill adjoining.

“ At the shore on the south-western foot of the height on which the obelisk stands, granite is to be seen as it were projecting from the body of the hill, with a mass of schist of a wedge-like form (or what in the language of Werner would perhaps be called “ shieldshaped”), coming in upon it from above. In advancing northward, the granite continues a little beyond this place, is succeeded for a short way by schist, then reappears, and seems to continue to the point of Dalkey.”

“ The schist at this place, consists of gneiss?, mica-slate, and clay-slate, in some places curiously intermixed with granite; and its beds seem in general to lean against the hill, forming a considerable angle with the horizon. A crystalline substance†, which is also observable on the top of the hills, appears here in a very remarkable manner covering large faces of the schist of several yards in extent with its stelliform groups.”

The numerous veins which traverse the mass of granite on the shore, from the place now mentioned to Dalkey, afford some of the most remarkable appearances that are to be observed there. In several instances two veins, themselves composed of granite,

† Andalusite.—See the latter part of this paper.

differing from each other, and from the mass through which they run, in fineness of grain, and in proportion of their ingredients, are seen to intersect ~~each other~~; one not unfrequently deranging the continuity of the other's direction; and the substance of these veins is perfectly continuous with that of the rock in which they occur, the surface of the fracture passing through both without interruption †.

“ At *Dalkey* the rock consists entirely of granite. A mine (which in 1805 had not been worked for several years) is situate on the shore to the south of the island, in a vein of fine grained granite, that runs into the sea in a south-eastern direction apparently dipping to the north-east, in which a drift had been made, and several shafts sunk. The ore is galena, the veinstones chiefly quartz and sulphate of barytes. A gap or fissure in the hill above the mine, to the westward, corresponds in its direction with this vein: and in the base of the hill, on the shore at some distance to the south of the works now mentioned, two other old mining drifts are also observable; near which fragments of sulphate of barytes with blende and galena are to be found.”

“ On ascending *Rockestown-hill*, by a road on its

† In the annexed sketch, figures 1, 2, 3, 4 & 5, represent detached portions of intersecting granite veins, at the place above mentioned; figures 6 and 7, are on a much smaller scale, from large detached blocks that occur along the shore;—these however were not the most remarkable that might have been selected. It should be observed that the veins in general are of a *lighter* colour than the rock; the plate being in this respect erroneous.

south-eastern side, which separates this hill from that on which the obelisk stands, a slaty rock, chiefly if not entirely consisting of argillite †, is observable: this near the highest part of the road is succeeded by granite, which constitutes the summit of Rochestown hill, and apparently the whole of its north and north-western sides. Detached blocks of the latter rock are to be seen here remarkable for a peculiar arrangement of the mica, which consists of small scales so disposed as to exhibit the appearance of feathers, or of the leaves of certain mosses; and some blocks of granite of the same description, are to be found also on the shore near Dalkey to the south.”

“ The junction of the granite with the incumbent rocks, at Rochestown, is highly deserving of examination. From the top of the hill a very remarkable ledge of granite runs in a straight line for upwards of a quarter of a mile, extending from a little below the summit on its south-eastern side, in a direction from N.N.E. to S.S.W. This ledge, which is elevated a few feet above the ground to the south-east of it, appears to form the boundary of the granite, as gneiss ‡ is to be found very near it along its whole extent, and in several places in contact with it. The schist appears to run up in a wedge-like form between the ledge now described and another a little to the eastward, which is much less extensive than the former, but corresponds pretty nearly with it in direction, its course being from S.W. by S. to N.E. by N.; and

† Clay-slate.

‡ Qu. Mica-slate?

beyond this again, still farther to the eastward, another wedge-like branch of the schist runs up between this second ledge and the obelisk-hill †.”

“The rock here, next the granite, consists of gneiss ‡, and at a little distance from it, of argillite (clay-slate);—the beds, which are nearly vertical but dip a little towards the sea, running parallel to the great granite ledge. The transitions from the one rock to the other we did not observe, but both contain great quantities of a crystalline substance which has some resemblance to the *chiastolite* or made, but on which I cannot at present venture to decide §. This substance seems to be more perfectly crystallized in the gneiss, but to form larger masses in the argillite; in both it has a stellated arrangement.”

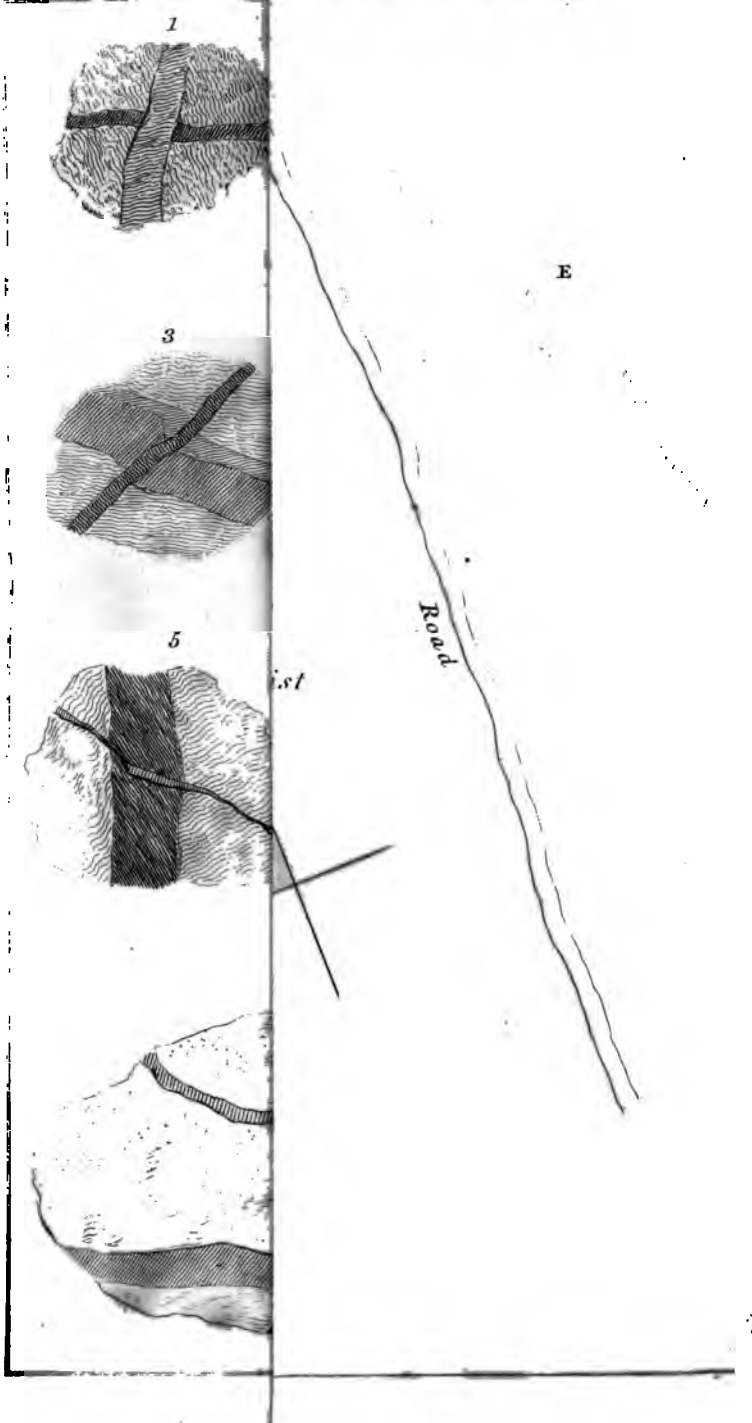
“The mode in which the granite is here connected with the adjoining rocks, is also well deserving of observation. In some places the face of a large mass of granite is covered with a thin coating of the micaceous rock; in others various intermixtures occur.

† In the annexed sketch, A denotes the summit of Rochestown-hill; B the first ledge of granite; C the second ledge; D the third ledge; E part of the obelisk hill.

‡ Qu. Mica-slate?

§ In another place however Mr. Stephens expresses doubt whether the substance contained in the rock which he has denominated gneiss, be not really distinct from that in the slate. The former, he describes as “having a reddish cast—its angles sharp—and yielding with difficulty to the knife;” while the latter substance “is of the same bluish gray colour as the stone in which it occurs—its angles are more or less rounded, and it yields easily to the knife.”—Is not the mineral in both cases *Andalusite*; in the last mentioned instance affected by decomposition, or less perfectly crystallized?—F.. See hereafter.

Granite, Gneiss, Schist at Rochester Hill.



In one place, where the rocks are in immediate contact, they are both crossed by an uninterrupted vein: and the granite is traversed in various directions by numerous veins, composed of the same ingredients with itself, but of a finer grain."

"We followed the upper ledge of granite down the hill to the S.S.W. as far as it preserved its direction, and strikingly distinct appearance: here deviating to the eastward it approached the sea, and after a short distance was concealed by the alluvial soil."

"From the summit of the adjoining obelisk hill, the ground which is occupied by schist at Rochestown, is plainly distinguishable from that where granite occurs, by the smoothness of its surface, and its being more covered with vegetation; owing I suppose to the decomposition of the former rock." And a similar appearance may be observed at the junction of granite with incumbent slaty rocks, at the Scalp, at Aghavanagh, and at several other places in this country†.

† This contrast of the aspect of the surface, is by no means peculiar to the species of rocks above mentioned; and is of course to be expected wherever the contiguous substances differ with respect to facility of decomposition, or the fertility of the soil which they produce when decomposed. At Brayhead, the boundary between the granular quartz which forms the summits, and the incumbent schist may be discerned at a considerable distance: the former presenting bare and rugged crags, the schist an even surface covered with vegetation. And at the hill of *Croghan*, in the King's County, where green-stone is in contact with secondary limestone, it is remarked by Mr. Griffith, junr. (Second Report, &c. on the Bogs of Ireland, p. 92), that the line of junction may be traced by the verdure of the ground over the former rock, which is remarkably fertile; the soil above the lime-stone being extremely barren.

The boundary of the granitic tract in proceeding from Rochestown towards the Scalp, passes to the north-west of *Shank-hill*, but its progress has not been traced in the intervening space; it would appear however that granite occurs in some detached portions, within the slaty rocks to the eastward of that hill. The rocks which are visible near the ruined church of *Rathmichael*, and between that place and Puckcastle, consist chiefly of gneiss †, in some instances mixed with granite, in others passing into argillite (clay-slate): the general direction of the beds being north-east and south-west.

“The conical mass which forms the highest point of this vicinity, consists entirely of a granular kind of quartz; and a ridge of the same substance extends from this cone, for about a quarter of a mile in a direction East by North. The summit stands in the centre of a beautiful amphitheatre formed by the surrounding mountains, and presents a station for a most interesting circular view.”

“A vein of lead-ore was opened at *Ballycorns*, near the foot of Shankhill, on the north-western side of a hill about half a mile to the eastward of the Scalp; which, when we visited the place, in 1807, had been worked to the depth of not more than six or eight feet, and about forty yards in length, and was open to the day at top. The rock was granite, which was there very near its junction with mica-sate: the

† Qu. Mica-slate?

course of the vein was from W.N.W. to E.S.E.; it was nearly perpendicular to the horizon, and at an average somewhat less than two feet in thickness. The ore was small grained galena intimately mixed with grey ore of antimony, and there had been found also some pure galena, and carbonate of lead; the vein-stones, were quartz, baroselenite, and argillaceous matter: and I have since that time seen, from a deeper part of the vein, steatite, mica, some calcareous spar, and a small quantity of iron pyrites, arsenical pyrites, and brown blende.

The *Scalp* is a very remarkable natural chasm, on the confines of the counties of Dublin and Wicklow, to the west of Shankhill; along the bottom of which the high road from the city has been conducted, amidst enormous masses of granite, piled on each other on both sides, in groups of the most picturesque appearance. The fissure is several hundred fathoms in length from north to south; and the height of the cliffs which form its sides, is such as to render very impressive the solitude of the place †.

“ The rock on both sides is granite, which continues to the southern or Wicklow side of the mountain, where mica-slate appears, in strata dipping to the south, and leaning against the hill. We ascended on each side of the road, and observed the junction, which

† Fissures similar to the *Scalp*, though on a much smaller scale, occur in other parts of the granite tract near Dublin; as at the foot of the mountains above Dundrum, and elsewhere. The mode of their formation offers an interesting subject of inquiry.

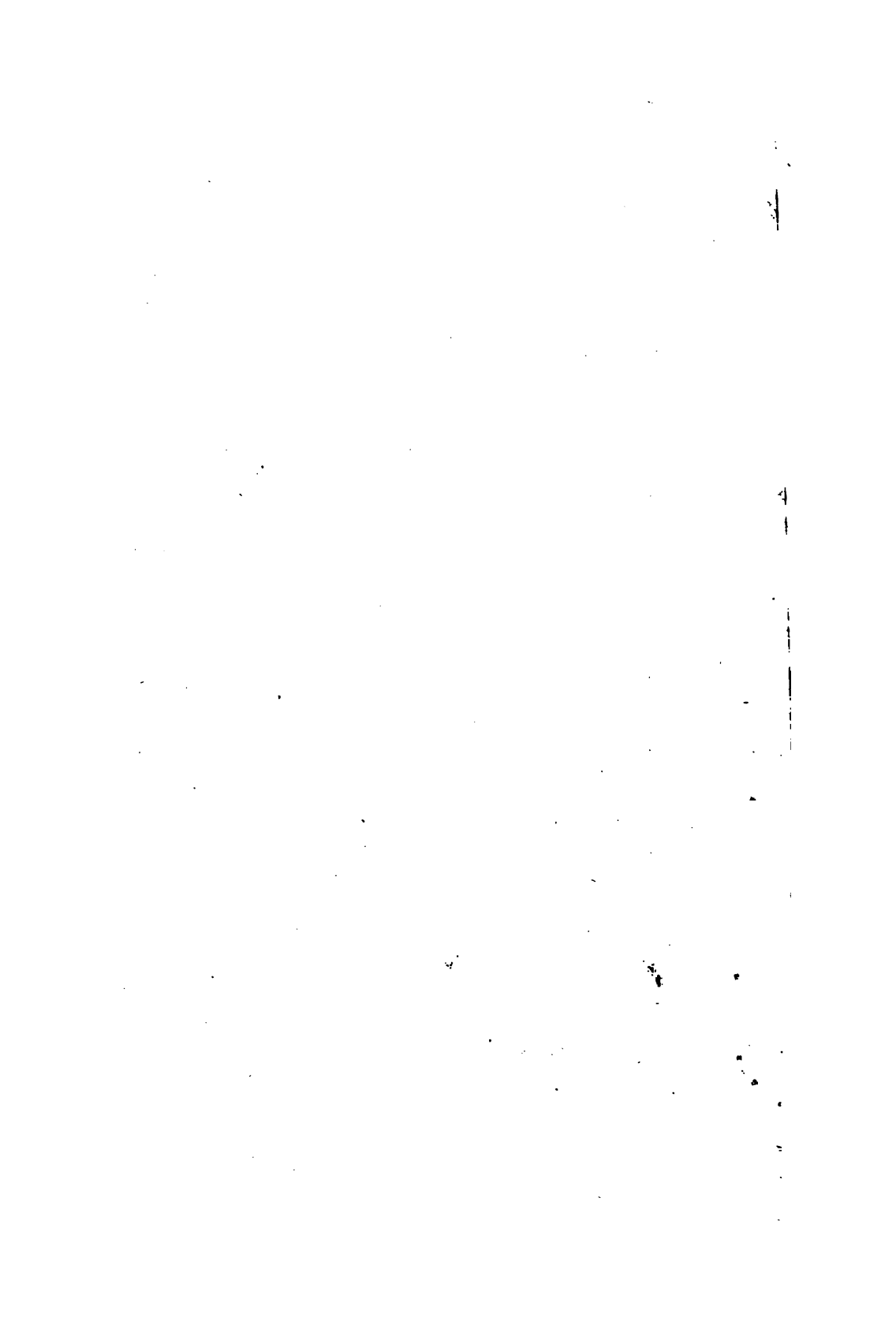
is there distinctly visible, and exhibits, particularly on the western side, the same remarkable appearance, as at the Killiney hills: namely that of a straight wall, or the edge of a quay, against which the schistose beds incline."

"The schist is here lower than the granite, and its surface is covered with earth and grass; that of the granite on the contrary is rugged, and where it is covered with soil, the vegetation is less luxuriant than that above the schist, so that the boundary can from this appearance be readily distinguished at a considerable distance."

"We observed here in the mica-slate on the eastern side of the road, the same mineral crystallized in quadrangular prisms which is so abundant at Killiney: and also indurated talc with a similar substance imbedded in it, and resembling the specimens obtained at Doucet."

"The whole of the *Greater-Sugar-loaf* mountain appears to be composed of granular quartz the same as that of the top of Shankhill; the sides of the mountain, where any stone is visible, are in general covered with loose fragments, and it is only in some steep places, and at the summit which is but a few yards in extent, that the solid rock is to be seen. The adjoining hill of *Stilebawn* seems to consist of the same substance, if we may judge from its general aspect, and from what we observed of its base: and the

† See p. 47, 49.

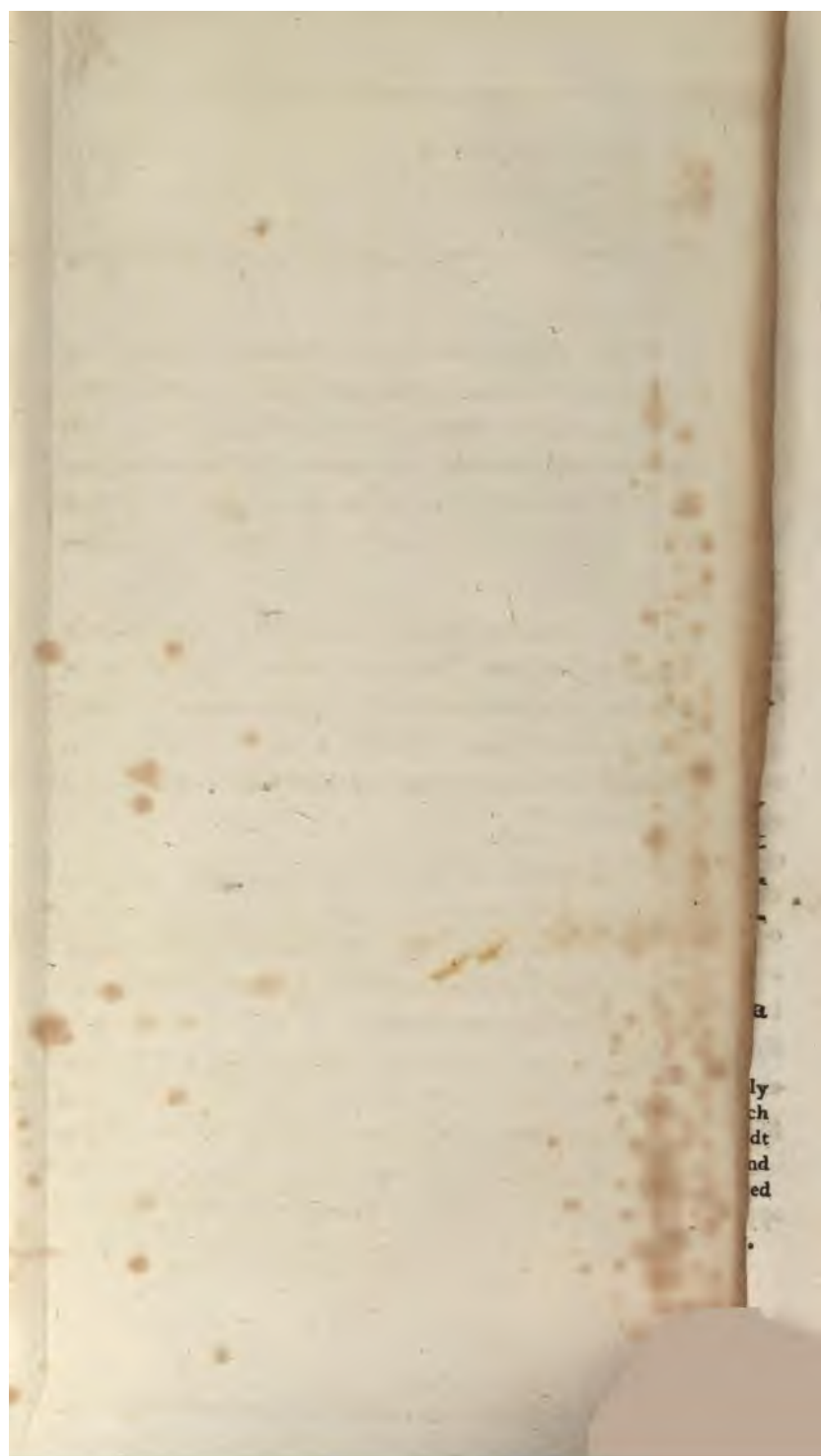


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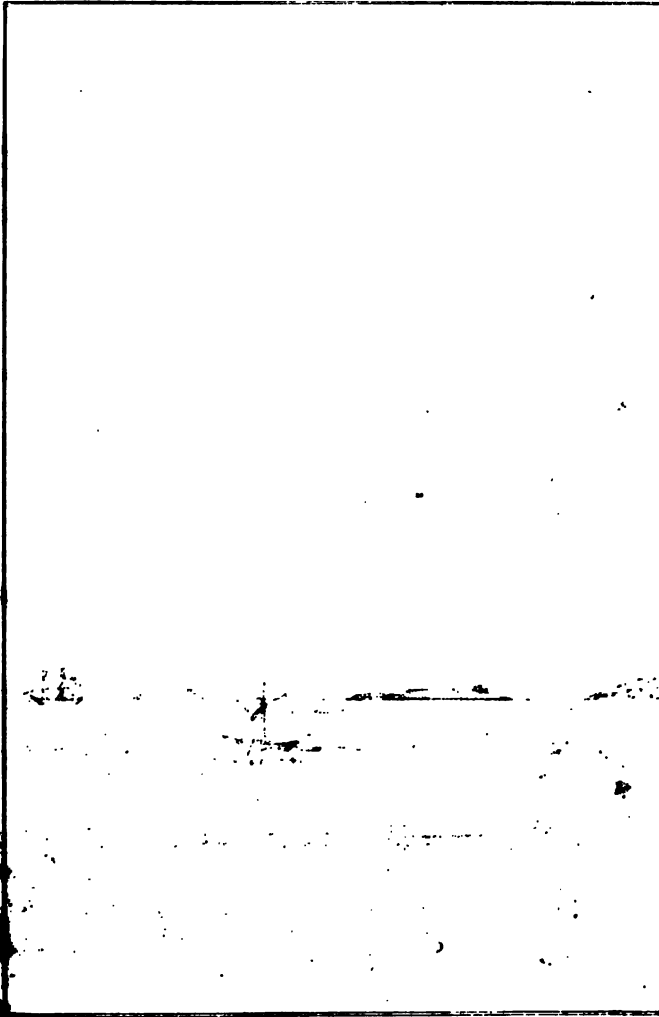
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gap which separates the two hills is remarkable for some curious appearances of the rock."

"The *Lesser Sugar-loaf* mountain, and the summits of *Bray-head*, which resemble it in figure and in general appearance, are also composed of quartz."

It appears therefore, that all the summits of this vicinity which agree in external aspect are composed of the same material ¶; and it is remarkable that the conical figure seems to characterize mountains consisting of quartz †, in various parts of the globe. I am informed by Mr. Jameson that he has seen in Lusatia, detached conical summits entirely composed of that substance, and that the summits of the same shape, in the mountains separating Caithness from Sutherland, are likewise formed of it: as also are the well known Paps of Jura, in the Western Isles of Scotland §.

Granular-quartz occurs in the lower ground, between the Sugar-loaf mountains and the Scalp, at "the *Dargle*;" the upper and by far the greater portion of the rocks within the enclosures there, consisting of this substance.

At the lower part of the *Dargle*, the rock is a

¶ See the annexed sketch.

‡ Siliceous earth in the form of this mineral, and therefore nearly pure, appears to constitute a portion of the earth's surface, much more important than some mineralogists have supposed. Humboldt states that near Caxamarca in Peru, a mass of more than nine thousand feet in thickness, is composed exclusively of quartz: he has not stated the form of the summits.—*Tableau Physique*, &c. page 128.

§ See Walker's *Economical History of the Hebrides*, vol. ii. p. 392.

purplish variety of argillite (clay-slate); and a stone apparently the same, is visible at the northern foot of Bray-head, where the succession and dislocation of the beds are very well deserving of attention.

The right side of the glen leading from the high road to the *Waterfall of Powerscourt*, appears to consist of mica-slate, that stone breaking through the ground in several places. On the left side, which we did not examine, the slope is more gentle and very little rock appears: but at the waterfall it is visible in masses of vast size, exhibiting in several places very curious inflections of its laminæ. We ascended by a path cut in the rock, to the top of the fall, and from thence winding to the left along the slope of the hill by its eastern side, we arrived at the summit of *Douce mountain* by an easy ascent."

"This mountain near its summit is entirely covered with peat, producing grassy plants to the very top, with little moss or heath. In our ascent, we observed on our right at some distance above the top of the waterfall, the ruins of cottages and enclosures, and on enquiry from some men who were cutting turf on the mountain, we learned that these had been inhabited about sixty years ago, and that remarkably fine crops of rye had been produced there; but they are now far above any habitation, or cultivated ground."

"On the summit of Douce mountain, mica slate appears in several places, in somewhat irregular strata,

the direction of which is nearly N.N.E. and S.S.W. and their dip about 45° E.S.E.

“ This mountain is considerably higher than the greater Sugar-loaf, and is among the highest of the county of Wicklow, but it seems to be exceeded in height by some of them, particularly Tonelagee and Lugnaquilla. The view from the summit is very interesting: in the distance we could distinguish Arklow-rock, the Goldmine-mountain (Croghan Kinshela), another mountain also I believe called Croghan, Lugnaquilla, Tonelagee, Mulloghclovane †, and several others; with an opening beyond Sallygap, to the flat country of the county of Kildare: while almost at our feet, were visible on one side Loch-dan, and on the other the glen of the Waterfall, and the rich country around Powerscourt and the Dargle.”

“ We began to descend towards the north-east, and about three-quarters of a mile from the top, at a place where the rock was laid bare, we found some of the most beautiful specimens of *Talc* I had ever seen §. In following the streamlet from thence to the Waterfall we observed mica-slate every where in its bed;

† The Irish names of places, however harsh to the modern English ear, are often very expressive to those who understand the native language of the country; alluding in general to some circumstance of natural appearance or position, or to some piece of local history; and the language is said to abound especially, in words discriminating very correctly the features of mountain scenery. For their sound it will not be necessary to apologize to the mineralogist; whose organs must be familiar with terms by no means remarkable for smoothness.

§ See p. 49.

and near the fall, blocks of granite, which seemed to have come down the valley to the westward. We afterwards followed up the course of this valley along the stream which forms the Waterfall, and after passing two streamlets on the left, came to a mountain of granite. This is about a mile from the fall, and is connected with Douce; the junction of the granite with the schist, is observable in the bed of the second streamlet above mentioned."

The line of junction in its progress from the Scalp to Douce, must cross the lower part of the Glen at the head of which the two *Lough's-Bray* are situated. The upper part of this valley, named *Glencree*, is composed entirely of granite, but the rock is not in general to be seen in its native bed, except about the two lakes, particularly in the precipices on the south-western side, and in some places where it has been cut into in forming the military road. The only rock visible along the road from hence to *Rockbrook*, on the Dublin side of the mountains, is also granite, which in general is much decomposed at the surface, and has been employed in consequence of this circumstance as gravel for the road."

"Descending from *Glencree* along the course of the stream, we observed granite in loose blocks the whole way to the second streamlet, which falls into it from the south, nearly opposite to a hill that projects remarkably into the valley on its northern side. We followed up this streamlet, taking that branch of it which leads to the right, to a sort of hollow bounded

by bare rocks of granite, down which the stream descends: here turning to the left we proceeded to the other branch, and ascending, came to a remarkable rock of *Gneiss*, the escarpment of which faces the north, the strata appearing to dip a little into the body of the mountain. From this gneiss rock we directed our course towards those of granite which we had just left, in order to discover the junction of the two substances: but before we had proceeded far, we perceived the gneiss to assume more and more of a granitic character, and at last become a perfect granite."

"In approaching *Sallygap*, along the military road from *Glencree*, we found the road occasionally strewed with small fragments of granite, consisting of large grains; the felspar, of a reddish colour, often constituting the greater part of the compound, through which the quartz is distributed in detached imperfect crystals, with very little mica; the whole resembling the "graphic granite" of Scotland. As we advanced the granite continued, of the common kind, in loose blocks on both sides of the road, frequently containing veins of a larger grain, and sometimes small garnets."

"A little beyond *Sallygap*, several excavations had been made at the road side from which gravel was taken for the road: this seemed to be disintegrated granite; it contained several veins of larger grain which had a considerable degree of firmness, as if they had resisted the power of some agent, that had caused the disintegration of the rest of the rock.*"

* In several places of this elevated tract of mountains, even to the

“ We pursued the course of the military road from hence towards *Glenmacanass*, and leaving on our right the mountain *Carricknashook*, which appeared to be composed of granite, crossed the valley of *Lugadrewans*, and from thence ascended by the bed of a stream to *Lough-Ouler*, mica-slate and granite occurring in loose fragments all the way. From the shores of the lake I went up the mountain to the left, at first meeting chiefly with fragments of schistus, and afterwards as I approached the summit of *Tonelagee*, granite, in large unconnected masses: on gaining the summit however, the former rock appeared in its native bed, forming the brow of the precipice which overhangs the lake; the strata dipping about 70° . towards the south, and running east and west. It is to be observed, that on the highest part of the mountain, several large blocks of granite occur.”

“ I had hitherto supposed that this mountain consisted of slaty rocks, but on proceeding northward along the brow of the precipice, I soon found the schist to be succeeded by granite in its place: and on descending towards the lake on the northern side, and looking back to the face of the precipice, I perceived the junction forming a line, which departing from a little projecting point at the head of the lake, ascends the cliff in an oblique direction, leaning perhaps 20° . or 30° . towards the north.”

vicinity of *Lough-Ouler*, we observed the roots and stems of fir-trees, which Dr. Stokes, who was my companion here, supposed to be the *Pinus silvestris*.” S.

To the east of *Tonelagee*, the boundary of the granitic tract seems to deviate a good deal from the course which it maintains pretty uniformly from its commencement at Killiney to the head of *Glenmacanass* †; the mountain on the western side of that glen, about the middle, being composed of granite, while that on the opposite side consists of slaty rocks, which continue to the waterfall at the upper part of the glen. The line of junction runs nearly in a straight line from the waterfall to the head of *Loch-Dan*, along the north-western flank of *Scard* (a mountain not named in Neville's map) which is principally composed of schist; and from the top of that mountain, it may be observed extending from the fall to the head of the lake, in the direction now described; and from thence nearly north and south, along the tops of the mountains, to *Lugge-law*.

We did not trace the course of the granite boundary from *Tonelagee* to *Glenmalur*, but there is reason to suppose that the line crosses the valley at the latter place, the upper part of which consists of granite, at, or very near the *Lead mines* ‡; from whence it seems

† "The granite at the head of Glen-macanass is remarkable, being partly of a very fine grain, partly coarser and of a waved texture, containing much garnet: and the schist at that place contains much of the mineral observed at Killiney."

‡ Since this paper was written, I have been informed that the sales of Lead, from ore raised and smelted at the Glenmalur mine, amounted during the year ending 31st Dec. 1811, to no less than £9,819. 16s. 2d. Irish currency. The weight of metal sold, was 6680 cwt. 2 qrs. at an average of about 31s. per cwt. for sheet lead, and 28s. for bars.

to proceed pretty directly, to the glen between the barrack at *Aghavanagh* and the summit of *Croghan-moira*, I have observed the junction in the bed of the stream at the glen last mentioned, and it has since been very distinctly exposed there in the course of the military road, about an English mile from the barrack. Its course is probably marked by a line which is discernible from the road on the mountain north of the glen; the surface to the east of the line being smooth, but rugged to the west of it. The beds through which the military road is cut from thence to *Glenmalur*, lean towards the west.

I have marked the termination of the granite, to the south of *Aghavanagh*, at the flank of *Croghan-Kinshela*, on the authority of Messrs. Mills and Weaver; who in their reports on the late works at the gold-mine †, describe that rock as occurring at the western part of the mountain, "in firm massive beds, whose joints run E. by S. and W. by N. that are visible in the western bank of the *Coolbawn* stream;" and add, that "the other parts of the mountain are apparently composed of blue argillite (clay-slate) varying much in its texture."

On the northern confines of the granite, in the more immediate neighbourhood of *Dublin*, its connection with the adjacent limestone is so much concealed by the incumbent soil and alluvial matter, that it is not easy to trace the course of the boundary. The line

† Transactions of the Dublin Society, Vol. I. p. 145. III. pp. 81. 22.

appears to commence on the shore of Dublin Bay, near *Booterstown*, a mass of compact limestone being visible on the strand at that place within a short distance of granite; but the rocks in the interval are covered with sand and gravel: from thence it must pass to the north of *Mount-merrion*, where granite is visible in its natural situation; and must cross the stream that runs from *Dundrum*, at no great distance from its union with the river *Dodder* at *Milltown*.

The neighbourhood of the last mentioned village, is the place where calcareous rocks have hitherto been seen the nearest to the granite of this country; beds of *magnesian-limestone* being traversed by the *Dodder* under the bridge of *Milltown*, and at *Classons-bridge*, about half a mile from thence; and also by the streamlet from *Dundrum*, near its junction with that river in the intermediate space.

The substance of which the beds now mentioned are composed, agrees very nearly in its characters with the *magnesian limestone* of several places in England; the importance of which in an economical view, from their affording a lime injurious to vegetation, has been proved by Mr. Tennant, in his valuable memoir on different sorts of lime employed in agriculture.† The analysis of these substances, taking the average of the specimens from various places examined by Mr. Tennant, gave, in one hundred parts of the stone,

† Philosophical Trans. for 1799; or Philos. Magazine, vol. 5. p. 209.

about 31 parts of lime, and about 20 of magnesia, both in the state of carbonate: and it would appear, as that gentleman has remarked, that these earths exist in the mineral, not accidentally united, but probably in chemical combination; their proportion being nearly constant in specimens from different places, and the chemical properties of the stone materially differing from those of a mixture of its components.

The specimens of the magnesian stone from *Milltown*, which I have lately been enabled to examine, exhibit the following characters:

Their colour is yellowish grey, with a slight admixture of brown.

The fracture is, in general, fine splintery; but when closely examined, it seems to be composed entirely of minute crystalline surfaces arranged in various directions; the whole of the mass apparently consisting of crystallized matter:—

The lustre of these facettes is splendid, and intermediate between vitreous and pearly.

In thin fragments, the stone is slightly translucent on the edges.

It easily scratches calcareous spar and common granular marble, but is scratched by fluor.

Specific gravity 2,8130 †.

† The specific gravity of calcareous spar, is 2.7182, and of common granular white marble, 2.7168: that of *Dolomite*, (which Mr. Tennant found to contain magnesia,) is according to Häuy, 2,85.

This substance effervesces slowly with diluted marine acid; and before the blowpipe it is rendered friable, and acquires a darker brownish colour.

A specimen of magnesian limestone, from the vicinity of Axbridge in Somersetshire, which I compared with that above described, had in general, a very strong resemblance to the latter substance. Its colour however was rather darker, the grain somewhat more fine, and its hardness greater, being little inferior to that of fluor spar: its specific gravity was 2.7608; and before the blowpipe it was rendered white.

The magnesian rock at Milltown appears to alternate with beds of calp, which are visible in the course of the Dodder between the bridges abovementioned, and at a quarry in the bank of the river between Clason's-bridge and the influx of the Dundrum stream: and it contains in some places, though but rarely, petrifications; which, like those in the magnesian limestone of Breedon in Derbyshire, mentioned by Mr. Tennant, consist of a substance apparently similar in composition to the stone itself. An alternation like that above described, of common limestone with the magnesian variety, has been observed, I am informed in the vicinity of Axbridge, beds of each kind occurring in repeated succession between that village and the sea; and the magnesian stone in that country agrees further with the beds at Milltown, in containing imbedded siliceous masses; which is likewise the case with that which occurs in Derbyshire near Matlock.

The *calp*, which abounds near Milltown and in several parts of the county of Dublin, is described in the following terms by Mr. Knox in the memoir already mentioned†; his account of its characters being taken from the specimen which he had selected for chemical examination.

“ Its colour was greyish black, inclining to blue.
Lustre 0. Transparency 0.

It scratched glass with difficulty, crumbling at the same time; did not give fire with steel.

Its lateral fracture was imperfectly conchoidal; transverse fracture, slaty, passing into the ^{course} grained earthy.

It gave a white streak.

When breathed upon, it gave an earthy smell.

Specific gravity at 60°. Farenheit; 2,68”.

This substance effervesces strongly with acids; when exposed to a slow heat in an open fire, it cracks and flies into thin flakes. When calcined, its colour is changed to yellowish grey, and it does not slake, like the lime obtained from common limestone.

One hundred parts gave, by a very careful analysis, the following components and proportions, viz.

† P. 10.—Transactions of the Royal Irish Academy, vol. viii. p. 207.

Carbonate of lime.....	68
Silica.....	18
Alumina.....	7.5
Oxyde of iron.....	2
Carbon and bitumen.....	3
Water.....	1.5

...The quarries in the neighbourhood of *Lucan*, (which may be considered as presenting the more usual geological characters of this stone), are described by Mr. Knox as exhibiting the following appearance. "Immediately under the vegetable mould is a thin bed of limestone-gravel, beneath which to a considerable depth, are strata of dark limestone separated from each other by beds of argillaceous shistust. The deeper the quarry is dug, the nearer the limestone seems to approach to the nature of calp; to which it at length arrives by gradual and scarcely perceptible transition."

In other instances however, the calp seems to occur immediately at the surface, without the intervention of limestone; and, if my information be correct, it sometimes alternates with beds of the ordinary kind, as it appears to do at *Milltown*, with those of the magnesian stone.

The masses of "Lydian stone", of various and irregular shape, which occur very commonly in the calp and limestone of this country, seem evidently to be of contemporaneous formation with the substances in

† Slate-clay?

which they are imbedded; for they coalesce completely with the surrounding calcareous matter, and in many instances pass into it by insensible gradation. Siliceous masses precisely similar are found, I am informed, in the limestone of several places in England; and in their shape and mode of connection with the calcareous rock, they have much resemblance to some of the nodules and plates of flint, that abound in chalk countries.

Granite is visible near *Dundrum* in the hill opposite the church, and in the course of the stream for some distance below that place. From thence I have traced it without apparent interruption, to the summit of the *Three-Rock-Mountain* and of *Garrycastle* to the south; and to the west, as far as *Rockbrook*, beyond the foot of *Kilmashogue*, where it is seen in its native place containing garnets; and I believe that no other stone will be found in its bed, within the space assigned to granite in the annexed map, to the north-east of a line passing from the *Scalp* to the summit of *Garrycastle*. The rocks however are often concealed there, even close to the foot of the mountains and at considerable heights above the sea, by an accumulation of alluvial matter, in several places, of great depth.

“ The masses from which the *Three-Rock-Mountain* takes its name, are, like the whole of that mountain, composed of granite; two of them which are on the

summit very near each other, are steep on the west side, and have their angles completely rounded off; while on the east they slope gradually into the ground, and their projecting parts are sharp. The third rock, which lies about two hundred yards south-east of the others, is a little lower, has its angles but slightly rounded, and is pretty steep on all sides."

Near the quarries above *Ballaly*, at the foot of Three-rock-mountain, I have observed a block of granite, which in the attempt to divide it by wedges, had disclosed a nucleus nearly globular; the outer part, to a considerable thickness, having come off in the form of a shell or case, in consequence either of original conformation in concentric layers, or from the effects of decomposition. Appearances somewhat similar resulting from the latter cause, have been observed by Saussure in Switzerland; in the Island of Arran by Mr. Jameson; and in other countries†.

At the foot of the mountain near this place, is one of the fissures already mentioned as somewhat resembling the Scalp in structure: the course of which is from west to east, parallel to the face of the mountain?

The granite may be seen to terminate, in the stream which leads from *Whitechurch* towards *Rathfarnham*, near the former place, where it is separated only by the stream from a slaty-rock in irregular shivery masses; and from thence to the last mentioned village no more granite appears. A quarry of limestone, in

† Jameson's Scottish Isles, 4to. p. 42, 43.

beds of one or two feet in thickness, has been opened near Rathfarnham bridge.

“ In proceeding along the bed of the river Dodder, from the place where it changes its direction and quits the plain, we observed, about a quarter of a mile on this side the gap of *Ballynascorney*, near a place called *Priortown*, a very slaty Trap†, in strata nearly approaching to a vertical position, and crossing the river in a direction from W. by S. to E. by N. As we proceeded up the stream, the sides of the valley became considerably elevated, appearing to consist of coarse gravel agglutinated, in many places, by an abundant calcareous infiltration: and about half a mile beyond the place where we first observed the Trap, we found in the stream, a large detached block of a reddish conglomerate, eight or ten feet in extent in one of its superficial dimensions; which, from the sharpness of its angles, could not have been removed to any very great distance from its original place.”

The basis of this conglomerate, is a reddish variety of quartz, coloured apparently by iron, and probably containing much aluminous matter: the imbedded pebbles, which are of various sizes from that of sand to some inches in diameter, consisting also of quartz, of different shades of red and white. Waterworn fragments of a compound of this description, are found in

† I give here the term employed by Mr. Stephens: the *Trap* of the Leskean cabinet, according to which I believe his names were assigned, is a mixture of hornblende, quartz and felspar. F.

Columnar rocks of the trap kind, have been observed at *Arklow-rock* at the south-eastern extremity of the county of Wicklow, by Dr. Wollaston and the Rev. Dr. Brinkley.

several places in the course of the Dodder, and even to a considerable height along the sides of the Dublin mountains; but their original situation has not yet been ascertained: which is the case also with the rounded fragments of greenstone porphyry that occur among the pebbles of the Dodder, and are very commonly to be seen in the pavement of the streets of Dublin†.

“ Further up the stream of the Dodder, immediately under *Ballymore-fin*, a rock of slaty texture is visible, with the appearance of strata nearly vertical, extending across the bed of the stream in a direction from S.W. by S. to N.E. by N.; which was the last stone we observed in its place until we came to the granite.”

“ We found here large masses of calcareous Tufa; and at one place, in the northern bank of the stream, a considerable quantity of that substance, probably in the situation in which it had been originally formed. And in the bed of the stream, from where we first entered upon it to this place, rounded masses had

† A conglomerate very like that described above, has been observed in its place, at the northern base of the *Hill of Allen* in the county of Kildare, by Mr. Griffith junior. It occurs to the south of beds of secondary limestone which are visible at Ballyteague, and has a conformable dip and inclination with them; the horizontal distance of the places being about an English mile and a half,—the dip of the limestone 30° East of South, at an angle of 51 with the horizon,—that of the conglomerate 30° East of South at an angle of 7°. The conglomerate is interstratified with beds of a deep brick red slate clay much interspersed with mica. The mass of the Hill of Allen, which rises to the south of these beds, is composed of unstratified greenstone which becomes more crystalline as it approaches the summit of the hill; and “detached masses of beautiful porphyritic greenstone thickly studded with large crystals of felspar, are frequently to be met with on the surface.”

continued to occur, some of them so large as a foot and upwards in diameter, composed of a variety of secondary limestone, evidently different from that which is found in beds in the neighbourhood of Dublin, and not far from the foot of the mountains.”

“ Further on, opposite to a hamlet on the north-east side of the river, called the *Brakes-of-Glassnamuckey*, near which are the ruins of the little church of St. Anne, rounded masses of granite begin to predominate in the stream; and hereabouts, or a little higher up, I suppose the mass of that rock to commence, for very soon after passing this place no other stone is to be seen. We did not indeed actually observe the granite in its native bed, till we had advanced a good way further, on account of the quantity of earth and loose stones with which the bottom of the valley is covered: but afterwards we saw the schist reposing upon granite, in the bed of a streamlet on the western side of the glen, nearly opposite to the hamlet abovementioned.”

The lower mountains which extend from Ballynascorney towards the west, to the Hill of Lyons, and from thence to the south, along the borders of the counties of Kildare and Wicklow, are composed of slaty rocks; but this tract has not hitherto been explored: nor has the boundary of the granite been traced between the head of the Dodder and *Golden-Hill* in the county of Wicklow. I have however marked the termination of the granite at the latter place, having seen there slaty-rocks at no great distance from it, although I do not at present recollect

their place of immediate contact. Extensive quarries of granite have long been opened in the neighbourhood of Golden-Hill; and the stone obtained there, is said to be far preferable to that of the mountains nearer to Dublin, for the purposes of architecture.

The boundary, from *Golden-hill* to *Kilranelagh*, is also still to be ascertained; but it must pass to the eastward of the remarkable waterfall of *Poula-Phuca*; the beds through which the Liffey has at that place forced its way, consisting of clayslate?†; and also to the east of *Hollywood-glen*, as well as of the hill of *Dunlavin*, which are composed of schistose rocks.

It appeared to me to be probable from several circumstances, that the course of the river Liffey had formerly been different from that which it at present holds at *Poula-Phuca*; most probably through the winding ravine which now forms the avenue from the high road to the Waterfall; and that at that period the river was the outlet of an extensive lake, the regularity of whose banks and bottom may still be traced, in the neighbourhood of the present course of the stream, above the fall.

The line by which the granite is bounded in the vicinity of *Kilranelagh*, beyond which place my observations did not extend in this direction, is by no means so regular as in the north-eastern part of this country; and I was not enabled to observe there the contact of that rock with any of the adjoining substances, nor to trace it to any extent: but I am in-


† Qu. Grey-wacke-slate?

formed that the junction has been recently disclosed at Ballyroan, on the south-western flank of Kilranelagh-hill; where, if my information be correct, it exhibits some uncommon appearances. The summit and south-western flank of *Lugnaquilla* are composed of mica-slate?, and the mass of Cadeen and of Kilranelagh-hill also consist of slaty rocks. Very large masses of hornblende are to be seen on the surface of the last mentioned hill on its western side; and I have found, to the north-east of it, angular blocks of a remarkable compound containing Vesuvian, (Idocrase,) hereafter described †.

The other places in this vicinity, where the occurrence of granite or of other rocks has been marked upon the map, have been inserted on authority which I believe to be correct: granite having been observed, as I am informed, at the following places, viz. at Knockaderry to the north of Cadeen; and to the south of it, at Killalish, Kiltegan, and Kilmacart: and in the neighbourhood of *Carlow*, where it nearly adjoins the limestone, at Brown's-hill.

IN the peninsula of *Howth*, which forms the extremity of the northern side of Dublin bay, several different kinds of rock, and some valuable productions are to be found. "In following the course of the shore on the south side of the hill, the first stone ob-

servable in its place is secondary limestone in beds, Further on and immediately incumbent on the limestone, is siderocalcite (magnesian limestone?) in considerable quantity; its situation corresponding with that of the limestone: and still further, but not visibly connected with these, grit or arenaceous quartz, (of which the abrupt rocks above Lord Howth's demesne on the north-west side of the hill, seem also to consist), with an appearance of irregular stratification in some places. This stone is soon succeeded by argillite, which continues as far the Martello-Tower; and the grit again appears from thence to the cove under Mr. Hannington's house."

"The cliffs at the place last mentioned, consist of strata of a sort of slaty clay or shale, intermixed with beds of the same sort of grit as that of which the greater part of the hill is composed. Some of the clay strata are penetrated by the siliceous matter, which gives them a greater degree of hardness than the others; and a most interesting spectacle is presented by this assemblage of beds, which vary in thickness from an inch to a foot. These are in general nearly vertical; in one place they diverge upwards in the form of a , the opening being filled up by

bending strata, thus ; the beds are of various

shades of colour, from brick-red to ash-grey; and are crossed by veins of quartz, and of chlorite, which substances are generally intermixed."

“The different degrees of hardness possessed by the strata now described, are the cause of their presenting a very singular appearance: the softer parts being washed away to a considerable depth, by the action of the atmosphere and the dashing of the waves, while the harder are preserved, and form a kind of stripes in relief. At the base of the cliff there is a prolongation of the harder strata running out into the sea; and to the east of this place, the hill on the shore consists of a soft kind of slate which is entirely smoothed down to a slope †.”

From the south-western side of Howth, *Grey ore of manganese* and *brown ironstone* (Museum of Dublin College, No's. 887—1067-8.) have been obtained in considerable quantity: and a variety of the *Earthy-*

† I have never had myself an opportunity of examining the rocks at *Howth*: but the specimens and information to which I have lately had access, confirm the observations of Mr. Stephens. What he has denominated *Siderocalcite*, seems from these specimens, to resemble the *magnesian limestone* of the beds near Milltown; which, alternating with *bluish grey limestone* abounding in petrifications, appears to form the lower ground at the western extremity of the hill, and to reach to the east, along the northern shore, beyond the town; the latter kind of limestone forming also the isthmus to the westward. The quartz rock above mentioned, is not unlike some of that which forms the summits of *Brayhead*, but at the latter place I did not perceive any marks of stratification; and the mass of the hill of *Howth* appears to be composed of a variety of *grey-wacke*, alternating with *grey-wacke slate*, of a greenish and yellowish-grey colour, which very much resembles a rock of this description also from *Brayhead*. If the substances now mentioned be really of the same nature with those which they resemble, the relation of these various rocks to each other in this country, can no where be better investigated, than at *Howth*.

I have seen specimens of *galena*, with a small quantity of *copper-pyrites* in granular quartz from the northern side of this hill: and brown blende with *galena*, in what seemed to be a variety of *calp*, from a vein on the shore at *Clontarf*. F.

black-cobalt-ore of Werner, has been found there by Mr. Stephens and Dr. Stokes, in the form of a coating of a rich blue colour, which incrusts the fissures of a rock of slate clay approaching to whetslate : (Museum No. 267). In this substance, Mr. Tennant has ascertained the presence of the oxides of cobalt and of manganese †; and the discovery of it at Howth, is of importance, as it indicates the probability of the existence of other more valuable ores of Cobalt in that neighbourhood.

† See Klaproth, Anal. Essays; Translation, vol. i. p. 569.

THE HEIGHTS of very few of the mountains in the district to which this paper relates, have hitherto been measured : the only published observation of the kind that I am acquainted with, being contained in a section annexed to the report on the Gold-mine by Messrs. Mills and Weaver, already referred to; where the summit of *Croghan-Kinshela* is stated to be 2012 feet above the river at Kilcarragh bridge, which is about four miles from the sea.

I have ascertained by the barometer, the heights of the following places in the county of Wicklow, above

the house of Mr. Greene at Kilranelagh †, viz.—

	FEET
<i>Lugnaquilla</i> , supposed to be the highest mountain of the county . .	2455.1
<i>Cadeen</i> , a mountain detached from the rest, and a conspicuous object from the adjacent country	1558.9
<i>Baltinglass-hill</i>	681.8
<i>Eadestown-hill</i>	749.4 †
<i>Brusselstown-hill</i>	740.1 †
<i>Kilranelagh-hill</i>	705.5 †.

Of the mountains nearest to Dublin;—

Garrycastle, one of the highest is . . 1531.7

Three-rock-mountain, adjoining the

last 1247.9—

above the level of the road at Ballinteer, near the house of Doctor Stokes; the height of which above the sea, is considerable.

The highest point of *Howth* is,

above high water mark at its base 567 feet.

The elevation of the plain country of Kildare above the sea, may be judged of, from that of the summit level of the Grand Canal, by which it is crossed to the

† Mr. Greene's House is (by a single observation) 95.08 feet, above the level of the cross roads at the bridge of *Tuckmill*, a little village on the river *Slaney*; the elevation of which above the sea will be very well supplied, when a branch from the Grand-canal shall be extended in this direction, as is intended. The distance of *Tuckmill* from the sea, in a direct line, is about eighteen English miles.

‡ The heights to which this mark is annexed, are from single observations; each of the rest is the mean from three observations, with two excellent barometers.

north of the Hill of Allen; that level being 264 feet above high water in Dublin-bay, taken from a mark made at the Pigeon-house by order of the Ballast-office.

I SHALL subjoin to the foregoing observations, an account of some minerals of not very common occurrence; which, with the exception of the last two, have been found within the district above referred to.

1. *Vesuvian*—(*Idocrase*, Haiiy). This substance was observed by Mr. Stephens, in specimens found by me at Kilranelagh in the county of Wicklow; where it occurs in irregular crystalline masses, in a rock composed of common garnet of a reddish brown colour, of quartz, for the most part greenish, apparently from the admixture of a lamellar fossil of that colour, and a small quantity of yellowish white felspar. The dodecahedral figure of the garnet was very distinct in several of these specimens; but the form of the Vesuvian was not so well exhibited, some indistinct prisms only being observable; and in general, the crystalline shoots of the latter mineral had assumed a diverging or stellated arrangement, an appearance which I have not observed in specimens of this substance from other places: but their easy fusibility, lustre, colour, and

other characters, were sufficiently decisive of their nature.

I could not discover the original situation of the compound above mentioned at Kilranelagh; but the size, the great weight, and angular form of the blocks consisting of it, render it probable that they were not far removed from their natural place: and the country in that neighbourhood is composed of primitive substances, among which *Garnet* rock is described by mineralogists, as constituting beds.

It is remarkable, that a compound much resembling that which I have now described, occurs also in the county of Donegal; from whence specimens in the cabinet of the Dublin Society, and that of Dublin College (No. 30), were obtained. The garnet and vesuvian in these specimens, are scarcely to be distinguished from those of Kilranelagh; and as at that place, are accompanied by quartz, often of a similar greenish colour; with the addition however, of bluish grey granular limestone, and of a fibrous substance, not improbably tremolite mixed with carbonate of lime. I have not seen any felspar in the specimens from Donegal. †

2. *Grenatite*—(*Staurotide*, Haüy). This mineral was detected by Mr. Stephens in a micaceous compound of which I found a specimen at the *Glenmalur* lead mines, in the county of Wicklow: and I have reason to suppose, that it is not very uncommon in the schistose rocks along the south-eastern

† This compound from Donegal, has been described by Mr. Sowerby; *British Mineralogy*, August, 1810. p. 133.

confines of the granite in that county. The crystals from Glenmalur were small; but their colour, form, and characteristic crossing, were very distinct, and they were infusible before the blowpipe.

3. *Beryl*—(a variety of *Emerald*—Haüy). This mineral was found by Mr. Stephens and myself, imbedded in granite, near Lough Bray, in the county of Wicklow: (Museum of Dublin College, No. 39). Mr. Weaver has discovered it in blocks of granite, near Cronebane in the same county; and I have obtained specimens, probably belonging to the same species, in the Dublin mountains, above *Dundrum*.

4. *Andalusite*.—(*Feldspath-apyre*, Haüy). This mineral has been found by Mr. Stephens and myself in very distinct specimens, on the north-east side of *Douce*-mountain, in the county of Wicklow; apparently imbedded in the mica-slate of which that mountain is composed, and accompanied by quartz, mica, and a remarkable substance hereafter to be mentioned. It differs from the Andalusite of Spain and of Scotland, chiefly in possessing an inferior degree of hardness; for although some specimens readily scratch glass, others yield easily to the knife: but the Count de Bournon has observed an equal variation in the hardness of specimens of this substance obtained by himself at Forez §; and I have found that of the Scottish stone to vary very considerably.

This mineral seems to have been first taken notice of, under the name of *Würflicher*-(cubic) *Feldspath*,

§ Journal de Physique, xxiv. (1789), p. 453.

by Karsten †; who took his description from specimens in the Leskean cabinet, now in the possession of the Dublin Society (No. 907-b, &c.): and by a comparison of these with some of the specimens abovementioned from Douce, I have ascertained the identity of Karsten's mineral with Andalusite. I have not found however, that his claim to the first detection of this species has been mentioned by subsequent writers; although his opinion with respect to its affinity with felspar, accords with that which Haüy is disposed from his latest observations to adopt: *Traité comparatif*, &c. p. 217.

To the Andalusite is also to be referred, a mineral which occurs in great abundance at Killiney in the county of Dublin, first observed there by Dr. Blake, and for some time considered as belonging to a species not described by mineralogists. The schist at the southern extremity of the *Scalp*, appears to contain the same substance, as well as that next to be described; and it is found also near the head of Glenmacanass. It is most remarkable, on the shore at *Killiney*, at the southern extremity of the cliff under the obelisk hill, where it abounds on the surface of the mica-slate, and also imbedded in the rock. In a recent fracture, it is imperfectly distinguishable from the mass of the stone; but as it resists decomposition better than the other substances of which the aggregate is composed, it appears very distinctly on the surfaces which have been long exposed to the weather.

† Bergmannisches Journal, vol. ii, (1788), p. 809.

The *Andalusite* when thus brought to view, appears generally in the form of embossed groups, consisting of slender prismatic crystalline shoots, of a dull greyish black colour; which are sometimes assembled in a stellated form, but more frequently without any determinate arrangement: these are commonly rounded at the edges from the effects of decomposition, and in that case, several of their principal characters are scarcely to be distinguished; but in the pieces least affected by exposure, when attentively examined, the crystalline form, colour, lustre, cleavage, and other characters of this species, are sufficiently distinct.

5. The andalusite of Douce mountain is accompanied as has been mentioned, by another mineral besides quartz and mica; the characters of which have much affinity to those of the *indurated talc* of Werner; and which is placed under that denomination in the collection of Dublin college (Nos. 495—6—7): a specimen of the same kind, stated to be from *Glen-dalough*, in the county of Wicklow, was found in that collection (No. 404); and a similar substance was observed by Mr. Stephens at the southern extremity of the Scalp.

The following are some of the characters exhibited by the specimens obtained at Douce, to which I have access at present; these specimens however are not very distinct, and I give this imperfect description, only with a view to point out this substance as deserving of further examination.—

The form under which it has principally occurred is that of four-sided prisms, nearly square; the length of which is in some instances more than thrice their breadth, without any visible acumination. These prisms however want several of the characters of genuine crystals; their external surfaces are uneven, their angles ill defined, and they have not in any direction, a plain foliated fracture: they have no determinate arrangement with respect to each other.

This substance is in colour yellowish-grey, approaching in various degrees to yellowish white; it is translucent, in about the same degree as wax.

The prisms above described, are in general closely invested with a coating of silvery mica; where this is not the case, their surface is obscurely shining.

The fracture transversely to the axis of the prisms, is irregularly curved, foliated, and splintery: it is composed of numerous scaly distinct concretions, sometimes radiating from the center of the prism; the lustre of which is splendid and pearly. In the direction of the axis, the fracture seems to be uneven passing into splintery.

This substance is scratched by calcareous spar, and easily cut by the knife: with a strong pressure it leaves a whitish trace on glass, which it sometimes scratches, apparently by the action of some harder particles dispersed through it.

The specific gravity of some of the purest pieces that I could select, was 2,888§.

Before the blowpipe, this substance seems to swell a little, from the separation of its folia, on the first application of the heat; it becomes white, opaque, and brittle, and in small fragments gives, with some difficulty, a solid white enamel.

In the specimens from Douce mountain, the connection of the mineral now described with andalusite, is very remarkable: several of the prisms, which on the outer part consist of the Talc-like matter, containing within a nucleus of andalusite, that in some instances fills nearly the whole of the interior of the prism, but in others forms little more than an axis, of an irregular figure and with rounded edges; from which the folia of the investing matter appear to radiate. The nature of the connection between these substances is still obscure: but the occurrence of talc in genuine crystals of the form above mentioned, has not hitherto been stated on any good authority; and it is not altogether improbable, that the prismatic form assumed by the substance now under consideration, may really be that of andalusite; the latter mineral having been wholly or partially removed, and the talc-like matter moulded in its place.

6. *Hollowspar*, Jameson—(*Macle*, Haüy.) Very distinct specimens of this mineral have been found by Mr. Davy at Aghavanagh in the county of Wicklow;

§ The specific gravity of Haüy's species *Talc*, including all its varieties, extends from 2,5834 to 2,8729.

and I have observed it at Baltinglass-hill, within a few miles of that place.

It may be collected from the preceding part of this paper, that Mr. Stephens had found reason to suppose, that a connection existed between the species *andalusite* and *macle*: although the specimens which he had seen, were not such as to enable him to decide on the precise nature of their relation to each other. The appearances of several specimens of the latter mineral, which I have since had an opportunity of examining, tend to confirm this opinion; and are nearly sufficient to induce me to conclude, that the crystalline part of that curious substance, is in reality the same with andalusite. In one of these especially, a very fine specimen of *macle* from Brittany in the possession of Mr. L. Horner, that part of the complex crystal, which is usually of a whitish or yellowish hue, has in several places the reddish colour, as well as the lamellar fracture, lustre and other characters of andalusite; and like that substance also, is infusible before the blow-pipe, becoming white and nearly opaque: and it is further remarkable, that in this specimen, as in those already mentioned from Douce-mountain, the crystalline matter is in some places invested with a coating of a talc-like substance: which is the case likewise, although less distinctly, with several of the specimens of andalusite that I have seen, from other countries.

THE following substances have been found in parts of Ireland not included within the district, to which the preceding part of this paper relates: but they may perhaps be subjoined without impropriety, as they have hitherto been rare, and are in other respects deserving of notice.

7. *Pitchstone.* This substance has been found in a vein traversing granite, in the vicinity of Newry, in the county of Down; where it presents the following characters; for part of the description of which, I am indebted to Mr. Jameson of Edinburgh.

Its colour is intermediate between mountain and leek green.

It is massive.

Fracture small and not very perfect conchoidal:

Internal lustre vitreous, and shining.

It exhibits lamellar distinct concretions: the plates being from about one-fourth to one-tenth of an inch in thickness, and further divisible into pieces of a rhomboidal form, of various angles.

The surface of the concretions is smooth, and strongly glistening.

The mineral in fragments, is slightly translucent on the edges:

It scratches glass, but is easily scratched by quartz:

It is easily broken:

Its specific gravity is 2,29.

Before the blowpipe without addition, it yields a greyish-white frothy enamel.

It is in some places porphyritic; containing imbedded minute crystals of felspar and of quartz.

A letter from a very intelligent observer, who has examined this substance in its native place, states the following particulars respecting its position and Geological relations; viz. "The vein is first observable in the Townland of Newry, at the bottom of a bank of granite, above half a mile from the northern end of the town, on the right of the road leading to Downpatrick: it crosses the road, and runs due westward, ending on the side of the great road from Newry to Belfast. Its length, so far as hitherto observed, is half a mile."

"The rock, which is covered with mould to the depth of about a foot, consists of grey granite: the vein is about two feet and a half or two and a quarter in width; at the places of contact both the granite and pitchstone are disintegrated, the latter being almost as soft as clay, but becoming gradually harder as it approaches the centre of the vein. The structure of the vein is foliated, the folia being perpendicular to the horizon, and also to the walls; and besides these, there are seams that run longitudinally, parallel to the horizon, and nearly perpendicular to the folia."

Although the substance above described presents some peculiarity, in being divisible into rhomboidal fragments; it approaches in this respect to the pitchstone of Arran "in lamellar concretions"; a variety considered by Mr. Jameson as having hitherto occurred only in that island†, and which holds, as it were, a

† Jameson's Mineralogy, vol. i. p. 261.

middle place, between the mineral from Newry and that possessing the more common characters. The occurrence of pitchstone in geological circumstances like those abovementioned, has hitherto been very rare; but Mr. Jameson has described a vein of it which traverses granite, observed by himself in the Island of Arran †.

8. *Wavellite*. This remarkable mineral has recently been found in the county of *Cork*, at *Springhill*, near *Tracton-abbey*, about ten miles south-eastward from the city. The Rev. Mr. Hincks, of the *Cork Institution*, who has been so kind as to send me some specimens of it from that place, informs me that it was found very near the surface, in digging the foundation of a cottage, in the neighbourhood of a hill composed of *finty-slate*; and that he has seen it adhering to a fragment of rock of that description: but it has occurred principally detached in the soil, in the form of spherical nodules irregularly grouped together, and of various sizes, the largest being about three-fourths of an inch in diameter. These nodules are coated externally with a yellowish-brown earthy crust, and within are of a crystalline structure; resembling in their appearance and properties the original *Wavellite* from *Devonshire*, described by Mr. Davy, from which substance indeed, some of the specimens from the county of *Cork* can scarcely be distinguished.

† *Mineralogy of Scottish Isles*, 4to. i. p. 81.

The most distinct and purest specimens of this mineral from the last mentioned place, that I have seen, exhibit the following characters, viz.—

The globules are formed of crystalline spiculæ radiating from a common centre; but the surfaces of these are seldom perfectly plane, and their figure when separated, is not distinctly to be discerned. The exterior of the nodules, is composed of the terminations of the crystalline shoots, which are dihedral and obtuse angled; the curvature of their surfaces however, did not admit of their being accurately measured.

The spiculæ are nearly transparent and without colour, or of a very light shade of yellowish green. The lustre of their surface is strongly splendid, and glassy, inclining to that of silk.

The cross fracture of the spiculæ seems to be flat conchoidal, with a splendid lustre.

This substance scratches glass; but it is so easily broken down as to render difficult the trial of its hardness.

The nodules are very easily divided in the direction of the rays, into sharp wedge-like fragments. The spiculæ are extremely brittle, and yield a white powder.

The specific gravity of a portion, which was very pure, and about 20 grains in weight, was 2,34.

Before the blowpipe, the spiculæ of this substance are separated from each other, becoming white, opaque, and friable, without any mark of fusion. The flame by passing over it acquires a slight tinge of green.

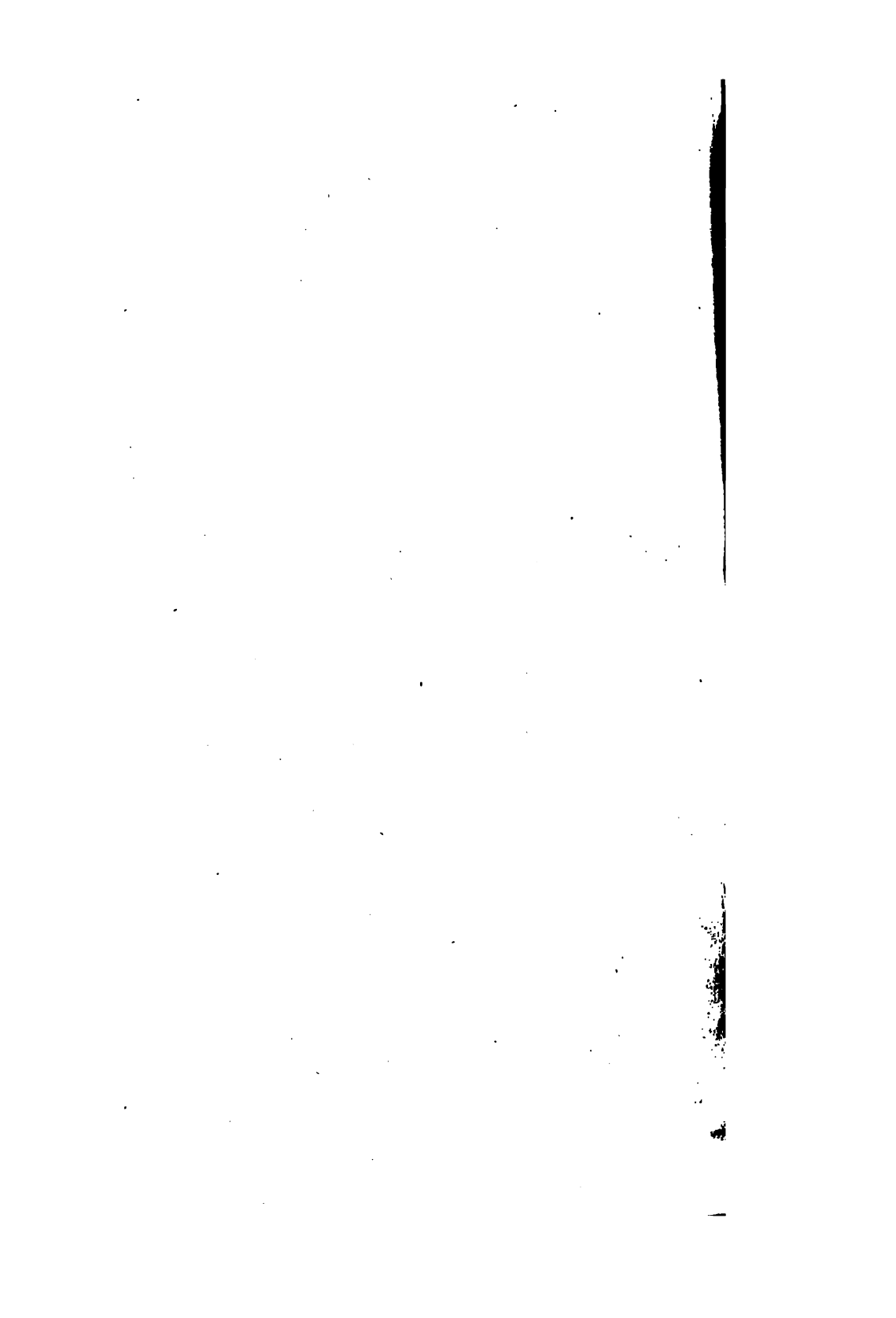
The nodules above mentioned are not unfrequently decomposed throughout; having lost their internal lustre and hardness, and acquired a dull grey or brownish colour. They sometimes, when in this state, contain numerous small spongy cavities: and in some cases they have been found reduced altogether to the state of clay, apparently from the effects of decomposition.

It would appear that the fluoric acid, of which Mr. Davy has ascertained the presence in the Wavellite from Devonshire, exists also in that from Cork; for glass is corroded by heating upon it, in a drop of sulphuric acid, a fragment of the mineral from either of those places.

THE END.









WEXFORD

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